State of Urban Transport in Asia and Sustainable Urban Transport Index for Asian Cities

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Outline

- SDGs and Transport
- State of Urban Transport in Asia
- Sustainable Urban Transport Index (SUTI)
- Strategies to Improve Urban Transport
- Concluding Remarks

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1. SDGs and Transport

2030 Agenda for Sustainable Development

Sustainable Development Goals & Transport

- *Road safety: By 2020, halve the number of global deaths and injuries from road traffic accidents (Target 3.6)*
- *Transport systems: By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons (Target 11.2)*
- *Energy efficiency: By 2030, double the global rate of improvement in energy efficiency (Target 7.3)*
- *Infrastructure: By 2030, develop quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all (Target 9.1)*

Sustainable Development Goals & Transport

- *Fossil fuel: Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, (Target 12.c)*
- Additionally, transport is an enabler for achievement of other sectors' targets, such as:
  - *Rural access and investment (target 2.1 and 2.a),*
  - *Air pollution (target 3.9),*
  - *Access to safe drinking water (target 6.1),*
  - *Sustainable cities (target 11.6),*
  - *Reduction of food loss (target 12.3) and*
  - *Climate change adaptation and mitigation (target 13.1).*

New Urban Agenda

HABITAT III, 17-20 October 2016 in Quito, Ecuador

- Improve road safety and integrate it into sustainable mobility and transport infrastructure planning and design *(para 113)*
- Promote access for all-safe, affordable, sustainable urban mobility *(para 114)*
  - Public transport and non-motorized modes
  - Transit Oriented Development
  - Coordinated transport and land use planning
  - Urban freight and logistics concept
- Develop mechanisms and frameworks –based on sustainable national urban transport and mobility policies (115 and 116)
- Develop sustainable urban and metropolitan transport and mobility plans *(117)*
- Ensure coherence with and integration of local and national level urban policies, national transport policy
- Ensure greater coordination of implementation of national and cities' urban infrastructure plans

Source: Adopted 20 Oct 2016

Regional Action Programme on Sustainable Transport Connectivity (2017-2021)

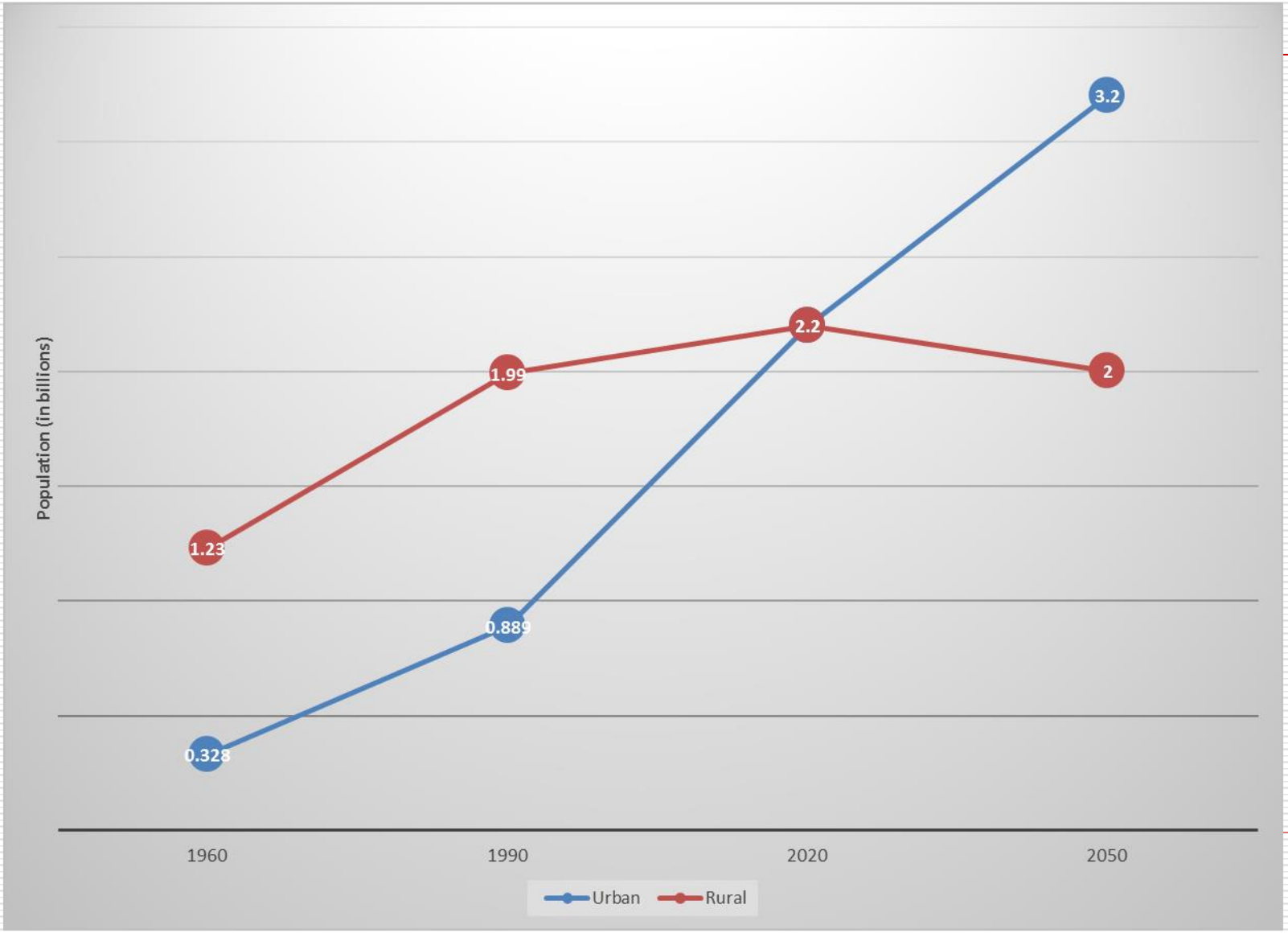
- Adopted by the Ministerial Conference on Transport, December 2016, Moscow
  - Regional transport infrastructure connectivity
  - Regional transport operational connectivity
  - Strengthening of transport connectivity between Asia and Europe
  - Transport connectivity for LDCs, LLDCs and SIDS
  - Rural connectivity to wider networks
  - Sustainable urban transport
  - Improving road safety

2. State of Urban Transport in the Region

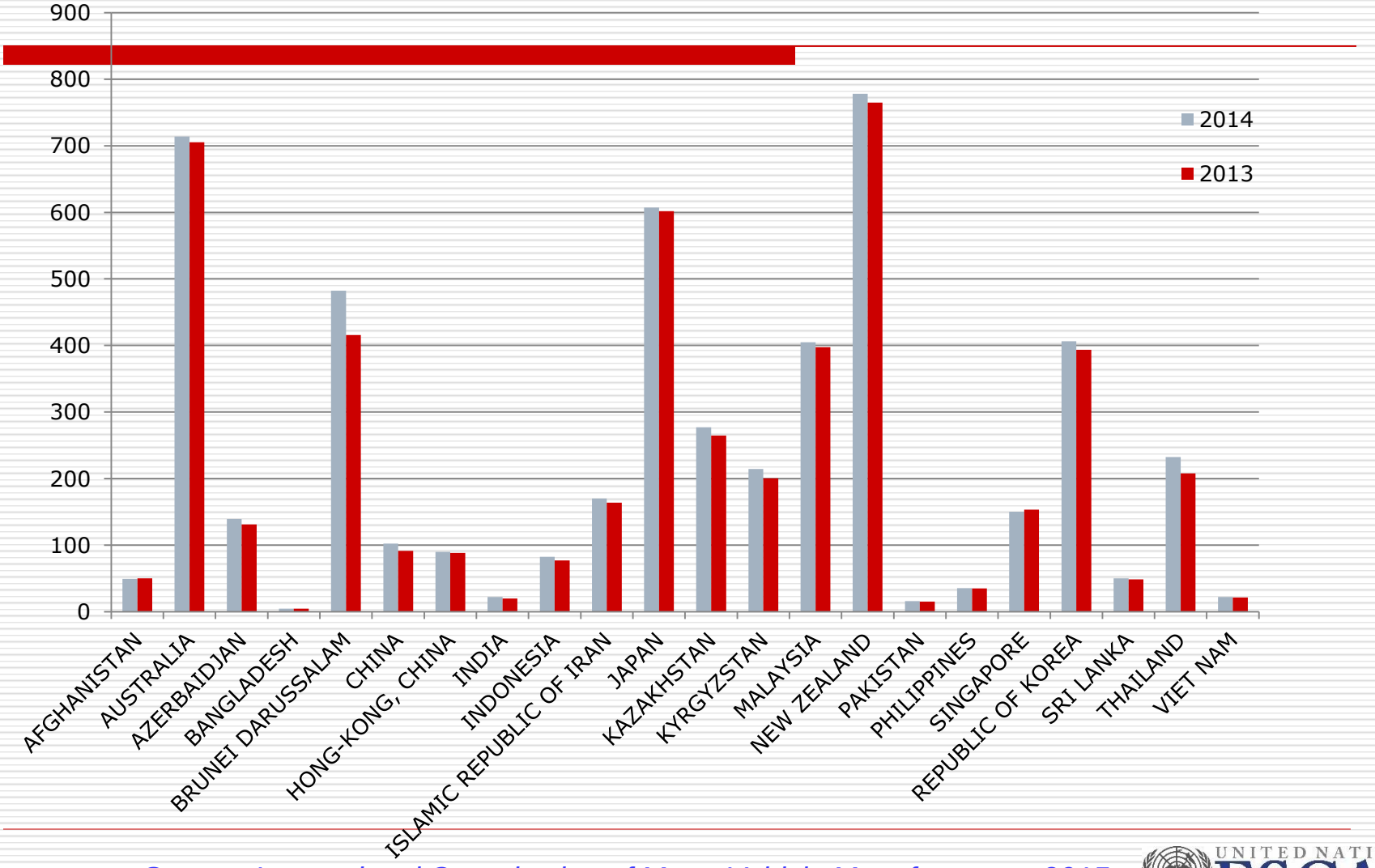
Pattern of Urban Development

- More than 2 billion Urban residents- 55% of world's urban population
- 23 of world's 37 megacities are in Asia
- 90% of world's urban expansion in developing countries- growing urban sprawls & slums
- Rapidly growing small & medium sized cities/ towns
- Cities account for more that 2/3 of energy use and GHG emissions
- Cost of Air pollution, congestion, road crashes: 5-10% of GDP
- Car centered developments & lack of affordable public transport
- Secondary and small sized cities- opportunities to plan and implement sustainable urban transport policies

Urban and Rural Populations in Asia and Pacific



Vehicles per 1000 people in Asia



Source: International Organization of Motor Vehicle Manufacturers, 2015

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Traffic congestion

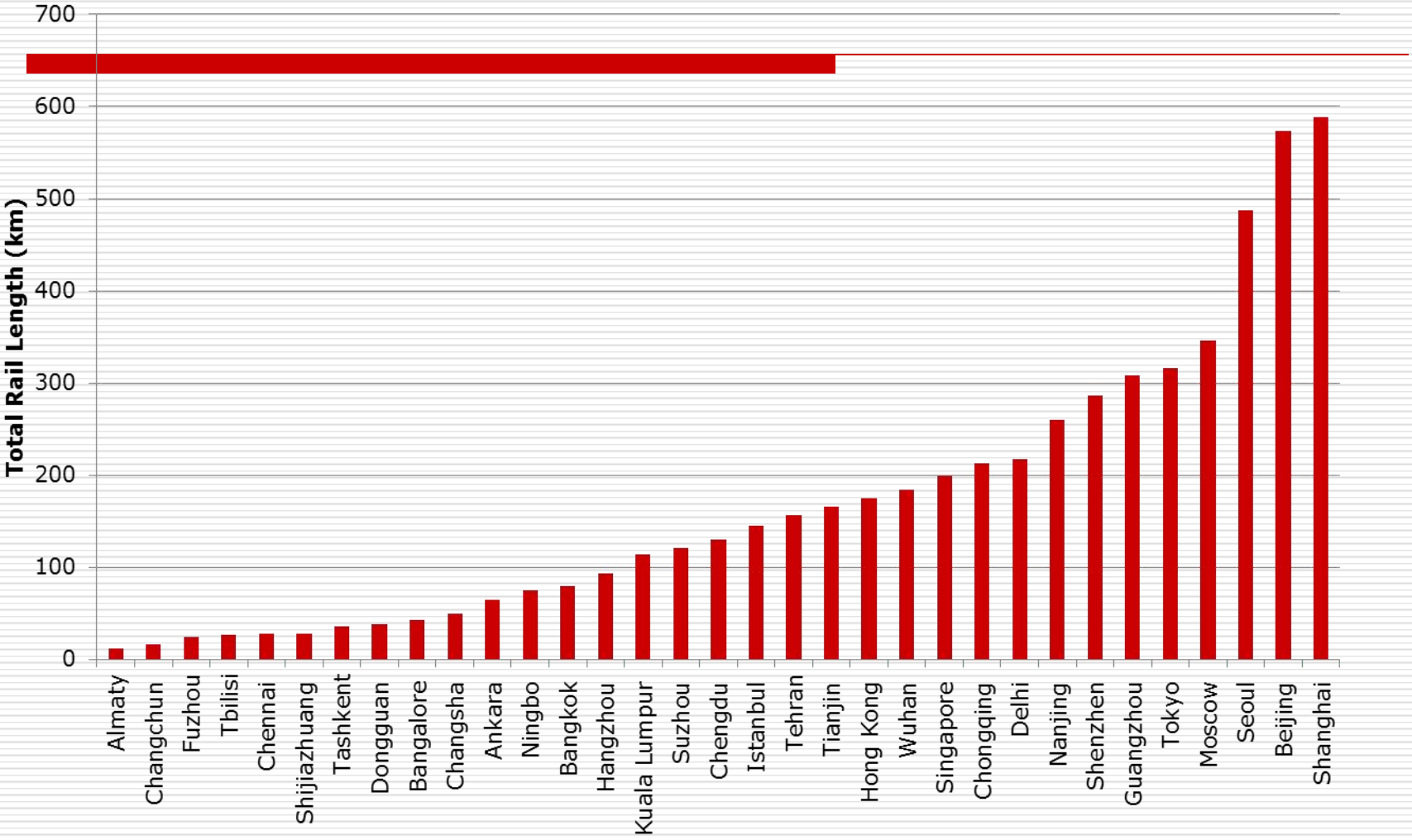
% change in travel time

Source: Tomtom Traffic Index 2016

Urban Transport in Asian cities

- Cities with Good Example of public transport : Tokyo, Singapore, Seoul, Hong Kong, China
- Mass transit system: Bangkok, Beijing, Delhi, Jakarta, Kuala Lumpur, Moscow, Tehran, etc.
- Bus Rapid Transit: Many cities in China and India
  - 42 Asian cities, 1579 route Km, 9.3 mil passengers/day
- Cities of LDCs, LLDCs
  - Mass transit: Almaty, Baku, Tashkent and Yerevan
  - Public mass transport in still developing stage
- Non-Motorized Transport: A significant proportion of the population in Asia still depends on walking & bicycling
- Bus service, para-transit, private vehicles
- Wide variance in the use of intelligent transport systems

Rail based MRT in Asian cities



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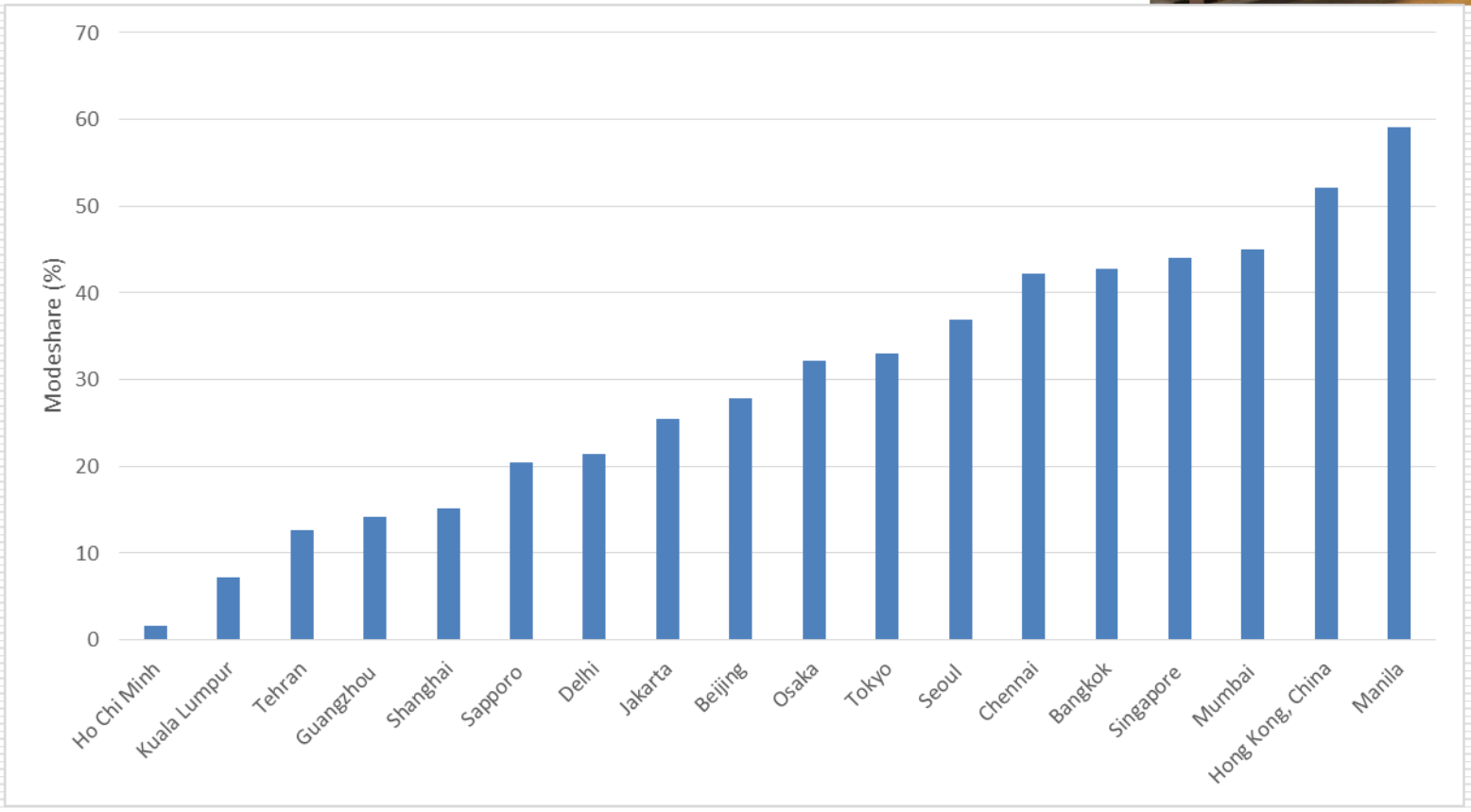
Public transport mode share in Asian cities



Capital costs of development of different mass transit systems

City	Type of system	Length, Km	Cost per km (mil $/km)
Janamarg, Ahmedabad	BRT	82	2.4
Kuala Lumpur (PUTRA)	Elevated rail	29	50.0
Kuala Lumpur Monorail	Monorail	8.6	38.1
Bangkok (BTS)	Elevated rail	23.7	72.5
Beijing Metro	Metro rail	113	62.0
Shanghai Metro	Metro rail	87.2	62.0
Bangkok MRTA	Metro rail	20	142.9
Hong Kong Subway	Metro rail	82	220

Source: Wright and Hook, 2007 and D. Hidalgo and A. Carrigan, 2010

3. Sustainable Urban Transport Index
Purpose of the SUTI

- To **measure** urban transport and progress towards Sustainable Development Goals (SDGs) in Asian cities
- To help **summarize, compare and track** the performance of urban transport in cities
- To **facilitate** discussion to develop plans and policies to improve urban transport
- **Simple Approach:**
  - Not too many indicators
  - Not complex calculations,
  - Simple, based on existing methodology, policies

General Methodology

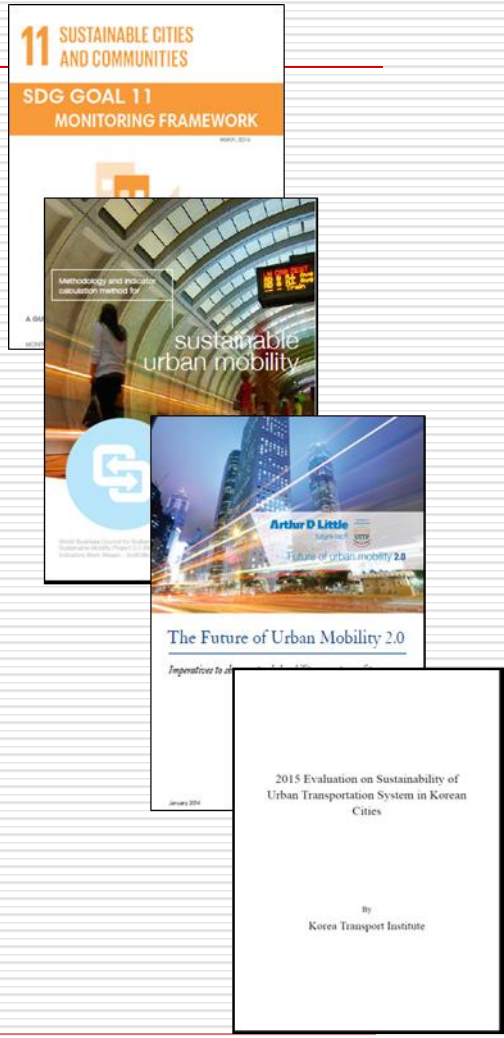
- Develop **framework** based on ST literature
- Identify, review and select **indicators**:
  - Framework based review
  - Criteria based review
  - Expert based review
- Construct **index**
  - Normalizing the indicators
  - Weighting the components
  - Aggregating components into one composite index

Framework, Foundation & Dimensions

Framework	Dimensions
Sustainable Development	Economic Dimension impacts
	Social Dimension impacts
	Environment Dimension impacts
Sustainable Mobility Paradigm	Avoid strategy
	Shift strategy
	Improve strategy
SDG Targets Relevant for Urban Transport	3.6 Deaths and injuries from road traffic
	9.1 Quality, reliable, sustainable, resilient infrastructure
	11.2 Access to safe, affordable, accessible and sustainable transport systems for all,
	11.6 Adverse environmental impact including air quality
	7.3 Improving energy efficiency
	13.2 Integrate climate change measures

Most important references

Extensive literature review of indicators



UN Habitat (2016)

- Suggests indicators to measure SDG goal 11, incl. target 11.2 on urban transport

WBCSD (2016) Sustainable Mobility 2.0

- 19 urban transport indicators
- Applied in six cities, three in Asia
- Detailed methodology

Arthur D Little/UITP (2014)

- 19 urban transport indicators
- 84 cities are covered, 30 in Asia
- Less detail, wider coverage

SUTE system, Korea (KOTI 2015)

- 24 indicators
- Applied annually to several Korean cites
- Detailed methodology

Identification of potential indicators

- **420** individual urban transport indicators identified
- Reduced to a **shortlist** of 20 most relevant indicators
- **Subjectively scored** using two sets of criteria
  - **Relevance** for Sustainable Transport framework
  - **Methodological** quality
- Resulting list of **10 indicators** in **four domains** :
  - Transport system, Social, Economic & Environmental domain
- Reviewed & agreed at two UNESCAP meetings:
  - Expert Group Meeting, Kathmandu, September 2016
  - Regional Meeting, Jakarta, March 2017

10 SUTI Indicators

No	Indicators	Measurement units	Weights	Range	
				MIN	MAX
1	Extent to which transport plans cover public transport, intermodal facilities and infrastructure for active modes	0 - 16 scale	0.1	0	16
2	Modal share of active and public transport in commuting	Trips/mode share	0.1	10	90
3	Convenient access to public transport service	% of population	0.1	20	100
4	Public transport quality and reliability	% satisfied	0.1	30	95
5	Traffic fatalities per 100,000 inhabitants	No of fatalities	0.1	35	0
6	Affordability – travel costs as part of income	% of income	0.1	35	3.5
7	Operational costs of the public transport system	Cost recovery ratio	0.1	22	175
8	Investment in public transportation systems	% of total investment	0.1	0	50
9	Air quality (pm10)	µg/m3	0.1	150	10
10	Greenhouse gas emissions from transport	CO2 Eq. Tons	0.1	2.75	0
	SUM		1.00		

All 10 indicators are described with

- Indicator **relevance** for sustainable transport framework
- Proposed **definition**
- **Unit** of measurement
- **Interpretation** in regard to sustainable transport
- **Minimum and maximum values** of indicator scale to use in the index construction
- Sources in the **literature**
- **Comments** on data availability and methods to provide data
- **Examples**

Normalization for SUTI

- SUTI is constructed by aggregating information from all 10 indicators
- Indicators on different scales need to be normalized
- The method used is linear rescaling to scale of 1-100
- Common approach in composite indicator used for several sustainable transport index

$$Z_{i,c} = \frac{(X_{i,c}) - (X_{min,i})}{(X_{max,i}) - (X_{min,i})} * 100$$

- Z is the normalized indicator X for topic i and city c.
- X_{min} is the 'worst' value of the indicator in actual units, whereas X_{max} is the 'best' value

SUTI Calculation

$$SUTI = \sqrt[10]{i1 * i2 * i3 \ldots i10}$$

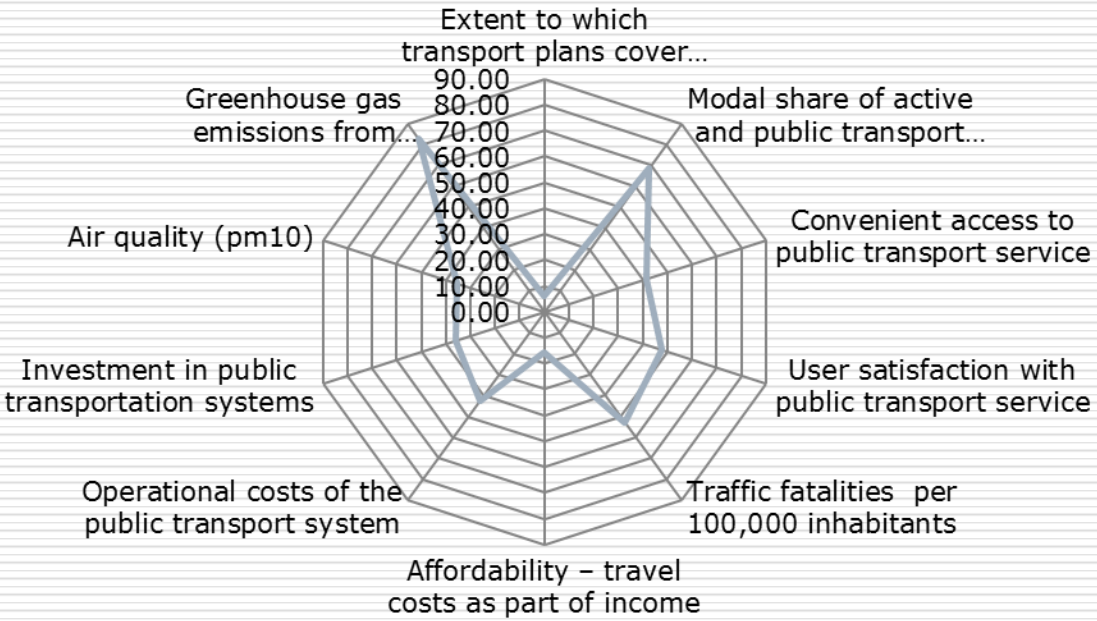
Where *i*1…*i*10 are the indicators

Geometric mean method chosen (similar to HDI)

'Equal weight' to each SUTI indicator is applied

Excel calculation sheet for data input and anlysis support

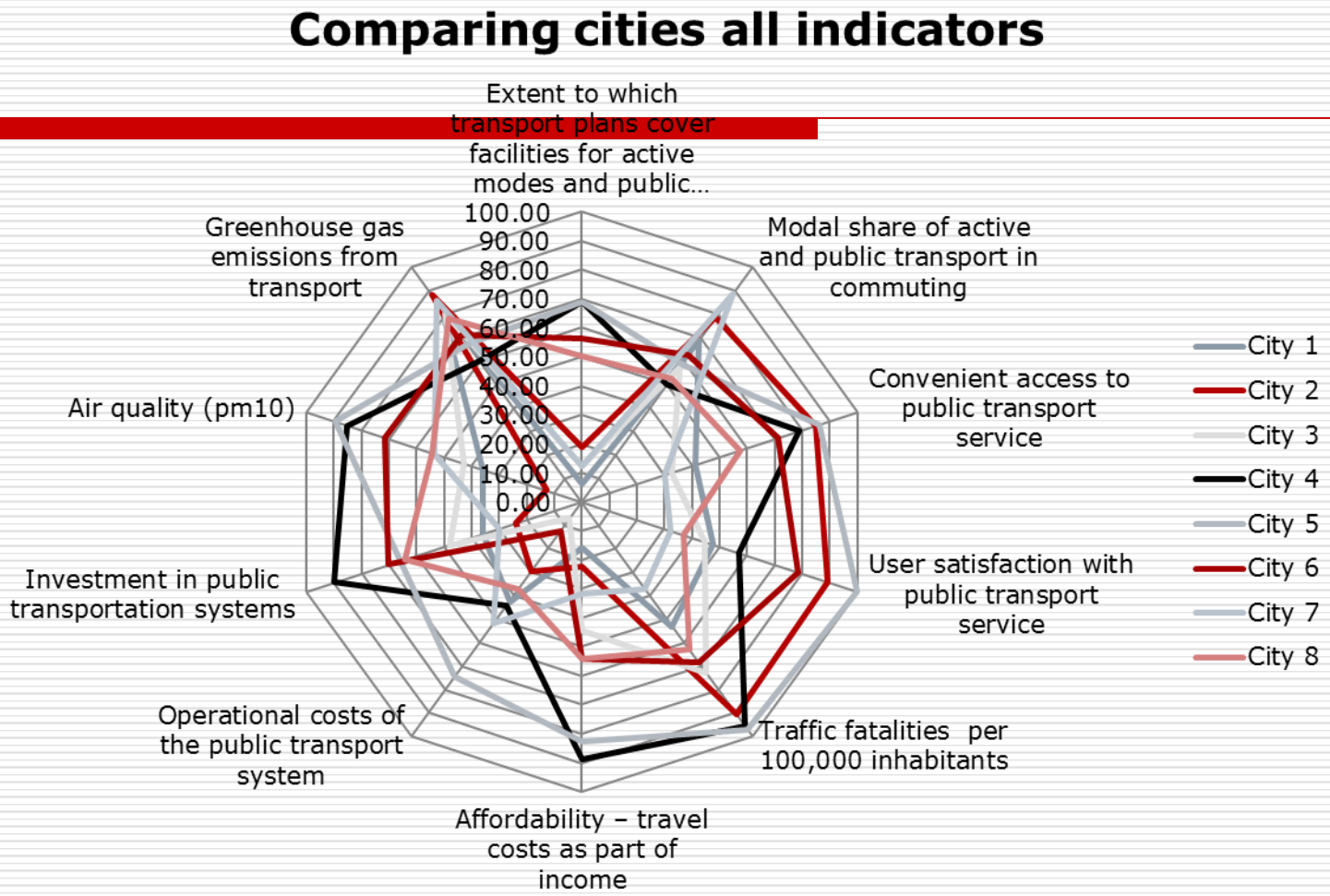
Single city -Spider diagram



SUTI-Normalized values for multiple cities

#	Indicators	DATA (cities)							
		1	2	3	4	5	6	7	8
1	Extent to which transport plans cover public transport, intermodal facilities and infrastructure for active modest	6.25	18.75	12.50	68.75	68.75	56.25	12.50	50.00
2	Modal share of active and public transport in commuting	68.75	78.75	57.50	50.00	58.75	62.50	88.75	52.50
3	Convenient access to public transport service	41.25	85.00	32.50	78.75	86.25	71.25	30.00	57.50
4	Public transport quality and reliability	47.69	89.23	44.62	56.92	100.0	78.46	32.31	36.92
5	Traffic fatalities per 100,000 inhabitants	53.09	90.57	73.14	95.43	96.86	68.57	37.14	62.86
6	Affordability – travel costs as part of income	15.87	22.22	44.44	88.89	82.54	53.97	31.75	53.97
7	Operational costs of the public transport system	42.48	29.41	7.19	44.44	74.51	12.42	51.63	37.25
8	Investment in public transportation systems	36.00	24.00	48.00	90.00	66.00	70.00	30.00	64.00
9	Air quality (pm10)	35.71	12.86	42.86	85.00	89.29	71.43	53.57	54.29
10	Greenhouse gas emissions from transport	82.55	88.00	80.00	60.00	67.27	70.91	85.45	78.18

SUTI for all cities-Spider diagram



SUTI for all cities-exemplification

SUTI Ranking for cities

City 5	77.90
City 4	69.60
City 6	56.30
City 8	53.48
City 2	42.22
City 7	39.39
City 3	36.33
City 1	35.54

SUTI next steps

- **SUTI** useful tool for urban transport
- **Data collection** and availability: Primary & Secondary
- **Frequency** of analysis: yearly, every two year?
- Performance of city across ten indicators
- Comparability across peer cities
- **Pilot application** in four cities: Colombo; Jakarta; Hanoi and Kathmandu

4. Strategies to Improve Urban Transport

- Integrated land use and urban transport planning
  - Improvement of public transportation
  - Intermodal transfer stations- optimum use of all modes
  - NMT- Pedestrian walkways, bicycle tracks
- Social inclusion- Affordability and coverage
  - Extend reach of public transport to vulnerable groups, communities
- Improve quality and reliability of service

Possible Policy Elements

- Road safety improvement
  - Regional goals targets and indicators
- Funding and operational costs

- Travel demand management
  - ICT, Compact city planning
  - Fare Integration, common ticketing
  - Parking policy, check private motor population

- Air quality and GHG
  - Clean Vehicle Technologies (energy, clean fuels)
  - Electric Mobility
  - Congestion management-Road pricing, car free areas/days

Concluding Remarks

- Need to enhance sustainability & safety of urban transport
- SUTI helps to monitor progress across ten indicators and compare with peers cities
- Develop and implement policies and strategies to improve urban transport systems
- Many successful examples in Asia
- SUTI application in other cities
- UNESCAP ready to support and collaborate

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Thank you

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